



COMMONLY OWNED CLAIMS

1 1. (Currently Amended): A non-naturally occurring quantum information processing
2 element offering precise control over its fabrication and operation comprising
3 a man-made cage, up to 100 nanometers in diameter, defining a calculated, artificial,
4 environment-isolating cavity that is bioengineered and formed from a plurality of artificially-
5 induced self-assembling purified Clathrin protein molecules,
6 and

7 one or more man-made cargo elements calculatedly located within the man-made cavity,
8 wherein at least one of the cargo elements comprises a man-made, artificially configured qubit
9 element that is by design programmable into a plurality of one or more logical states, which
10 states can deliberately entail, promote, enhance, and exploit the properties of quantum coherence,
11 superposition, entanglement, communications, and other quantum phenomena that are not
12 practically used in naturally occurring systems because by definition the latter do not offer the
13 precise control over their fabrication and operation that is required for quantum information
14 processing,
15 and

16 one or more of these man-made elements can be calculatedly expressed as non-naturally
17 occurring quantum memory, register, bus, wire, logic gate, communications, error correction, i/o
18 module, encoder, decoder, and other information processing functions not found in nature,
19 enabling the functional basis of a man-made quantum computer.

1 2. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising artificially configured receptors for artificially capturing and calculatedly
3 positioning one or more artificially configured cargo elements within the man-made cavity
4 vesicle such that it enables non-natural placement of one or more cargo elements with minimal
5 inter-element spacings, thereby allowing dense cargo element packing and with minimal inter-
6 cargo interference.

1 3. (Currently Amended): A non-natural quantum information processing element according
2 to claim 2, comprising an artificial vesicle located within the artificially configured cage and

3 enclosing one or more artificially configured cargo elements, wherein the artificially configured
4 receptors extend through the man-made vesicle to capture and calculatedly position a artificially
5 configured cargo element within the man-made vesicle such that it enables non-natural
6 placement of one or more cargo elements with minimal inter-element spacings and with minimal
7 inter-cargo interference.

1 4. (Currently Amended): A non-natural quantum information processing element according
2 to claim 3, comprising artificially configured adaptors calculatedly disposed between the
3 receptors and the artificially configured cage and artificially binding to the one or more
4 artificially configured receptors such that it enables non-natural placement of one or more cargo
5 elements within the man-made vesicle.

1 5. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising a man-made vesicle located within the artificially configured cage and
3 artificially and calculatedly enclosing one or more artificially configured cargo elements.

1 6. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising artificially configured molecular tethers for artificially capturing and non-
3 naturally positioning one or more artificially configured cargo elements within and or outside the
4 man-made cavity.

1 7. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising artificially configured direct cage bonding for artificially capturing and
3 non-naturally positioning one or more artificially configured cargo elements within and or
4 outside the man-made cavity.

1 8. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising artificially configured receptors, molecular tethers and direct cage
3 bonding for artificially capturing and non-naturally positioning one or more artificially
4 configured cargo elements within and or outside the man-made cavity.

1 9. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the one or more artificially configured cargo elements of a subset of the

3 quantum information processing elements further comprises a non-permeable, calculated, man-
4 made cavity.

1 10. (Currently Amended): A non-natural quantum information processing element according
2 to claim 3, comprising a man-made vesicle forming an artificial, non-permeable, calculated,
3 man-made cavity.

1 11. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising a artificially configured self-assembling cage that is man-made to be
3 electrically neutral and that calculatedly inhibits charge transfer between the artificially
4 configured cage and its enclosed, artificially configured cargo elements, thereby deliberately
5 promoting and enhancing quantum coherence.

1 12. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising a artificially configured self-assembling cage that calculatedly reduces the
3 natural tendency of a plurality of logical states in a quantum coherent state to collapse into a
4 classical decoherent state.

1 13. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising a artificially configured non-qubit-only cage that calculatedly inhibits
3 non-quantum information processing cargo elements from interfering with bio-engineered qubit
4 cargo element operation in one or more other artificially configured cages that calculatedly
5 function as man-made quantum memory, register, bus, wire, logic gate, communications, error
6 correction, i/o module, encoder, decoder, and other information processing functions not found
7 in nature.

1 14. (Currently Amended): A non-natural quantum information processing element according
2 to claim 3, comprising a self-assembling man-made vesicle that by human design is calculated to
3 be electrically neutral and calculatedly inhibits charge transfer between the man-made vesicle
4 and its enclosed, artificially configured cargo elements.

1 15. (Currently Amended): A non-natural quantum information processing element according
2 to claim 3, comprising an artificial, self-assembling insulative vesicle that non-naturally reduces
3 the usual tendency of a plurality of logical states in a quantum coherent state to collapse when
4 observed or interfered with into a classical decoherent state.

1 16. (Currently Amended): A non-natural quantum information processing element according
2 to claim 4, comprising artificially configured self-assembling receptors and adaptors that are by
3 human design electrically neutral and calculatedly inhibit charge transfer between the man-made
4 vesicle and artificially configured cage and their enclosed, artificially configured cargo elements.

1 17. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising a artificially configured self-assembling cage that calculatedly reduces
3 natural and man-made contaminant background radiation to artificially configured cargo carried
4 within the artificially configured cage.

1 18. (Currently Amended): A non-natural quantum information processing element according
2 to claim 3, comprising an artificial self-assembling vesicle that calculatedly reduces natural and
3 man-made contaminant background radiation to artificially configured cargo carried within the
4 man-made vesicle.

1 19. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising an artificial, self-assembling framework of artificially configured cages to
3 that by human design structurally support one or more self-assembling artificial QIP quantum
4 information processing elements.

1 20. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising an artificially configured, self-assembling, electrically neutral substrate of
3 artificially configured cages to structurally support one or more of the artificially configured self-
4 assembling, artificially configured quantum information processing elements, forming a
5 calculated design.

1 21. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, comprising an artificially configured self-assembling framework of artificially
3 configured cages to structurally order one or more self-aligning artificial quantum information
4 processing elements, forming a calculated design.

1 22. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein an artificially configured cage is by calculated design is left intentionally
3 empty and includes no cargo elements.

1 23. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the one or more artificially configured cargo elements is implemented as a

3 single artificial cargo element comprising a non-naturally occurring qubit calculatedly
4 programmable into a plurality of one or more logical states, which cargo element can be
5 calculatedly expressed as man-made quantum memory, register, bus, wire, logic gate,
6 communications, error correction, i/o module, encoder, decoder, and other information
7 processing functions not found in nature.

1 24. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the one or more artificial cargo elements are calculatedly a plurality of
3 artificial cargo elements.

1 25. (Currently Amended): A non-natural quantum information processing element according
2 to claim 24, wherein the plurality of one or more artificial cargo elements are non-naturally
3 occurring qubits programmable by human design into an calculatedly plurality of logical states,
4 which cargo elements can be calculatedly expressed as man-made quantum memory, register,
5 bus, wire, logic gate, communications, error correction, i/o module, encoder, decoder, and other
6 information processing functions not found in nature.

1 26. (Currently Amended): A non-natural quantum information processing element according
2 to claim 24, wherein at least some of the plurality of artificial cargo elements are intentionally
3 induced to be quantum information processing cargo elements, which cargo elements can be
4 calculatedly expressed as man-made quantum memory, register, bus, wire, logic gate,
5 communications, error correction, i/o module, encoder, decoder, and other information
6 processing functions not found in nature.

1 27. (Currently Amended): A non-natural quantum information processing element according
2 to claim 24, wherein at least some of the plurality of artificial cargo elements are fabricated to be
3 non-quantum information processing cargo elements.

1 28. (Currently amended): A non-natural quantum information processing element according
2 to claim 1, wherein the artificial cargo elements calculatedly respond to artificially directed
3 stimuli internal and external to the cage.

1 29. (Currently amended): A non-natural quantum information processing element according
2 to claim 3, wherein a man-made vesicle and its contained cargo elements calculatedly respond to
3 certain artificially directed stimuli internal and external to the vesicle.

1 30. (Currently amended): A non-natural quantum information processing element according
2 to claim 24, wherein a subset of the artificial non-quantum information processing cargo
3 elements include one or more therapeutic artificially configured single task and or multitask in
4 vivo and in vitro agents that are calculatedly induced to perform a specific task.

1 31. (Cancelled):

1 32. (Cancelled):

1 33. (Cancelled):

1 34. (Currently Amended): A non-natural quantum information processing element according
2 to claim 24, wherein a subset of non-naturally occurring qubit and non-quantum information
3 processing cargo elements include one or more man-made, selectable emission quantum dots that
4 calculatedly perform one or more logical operations using spin, and also deliberately having
5 minimal material surrounding the quantum dot, which, by reducing contaminating background
6 radiation, increases quantum coherence times and improves the performance of a quantum
7 computer system and also improves the scalability of a quantum dot-based quantum computer.

1 35. (Currently Amended): A non-natural quantum information processing element according
2 to claim 24, wherein a subset of the artificial cargo elements include one or more man-made,
3 selectable emission photonic dots that calculatedly perform one or more logical operations using
4 spin, and also deliberately having minimal material surrounding the photonic dot, which, by
5 reducing contaminating background radiation, increases quantum coherence times and improves
6 the performance of a quantum computer system and also improves the scalability of a photonic
7 dot-based quantum computer.

1 36. (Currently Amended): A non-natural quantum information processing element according
2 to claim 24, wherein a subset of the artificial cargo elements intentionally include one or more
3 artificially configured liquids without artificial dopants or with one or more artificial dopants of
4 any suitable man-made type that calculatedly produce a desired effect.

1 37. (Currently Amended): A non-natural quantum information processing element according
2 to claim 24, wherein a subset of the artificially configured cargo elements intentionally include a
3 artificially configured gas or vapor without dopants or with one or more artificially configured
4 dopants of any suitable man-made type that calculatedly produce a desired effect.

1 38. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein one or more artificial qubit cargo elements are intentionally programmed to

3 perform logical operations by one or more calculated man-made pulses of electromagnetic
4 radiation, via which qubit cargo elements and their operations calculatedly function as man-made
5 quantum memory, register, bus, wire, logic gate, communications, error correction, i/o module,
6 encoder, decoder, and other information processing functions not found in nature.

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1 39. (Cancelled):
1 40. (Cancelled):
1 41. (Cancelled):
1 42. (Currently amended): A non-natural quantum information processing element according
2 to claim 1, wherein the non-naturally occurring qubit ~~includes an unpaired electron~~ and the
3 plurality of intentionally induced logical states of the non-naturally occurring qubit ~~are defined~~
4 ~~by electron have one or more spin polarization properties and attributes that are calculatedly~~
5 defined.

1 43. (Cancelled):
1 44. (Cancelled):
1 45. (Currently amended): A non-natural quantum information processing element according
2 to claim 1, wherein the non-naturally occurring qubit includes a ~~nitroxide molecule~~ one or more
3 species of molecules that are calculatedly induced to have one or more logical states, which
4 molecules can be calculatedly expressed as man-made quantum memory, register, bus, wire,
5 logic gate, communications, error correction, i/o module, encoder, decoder, and other
6 information processing functions not found in nature.

1 46. (Cancelled)
1 47. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the non-naturally occurring qubit is photon-based and the plurality of
3 calculatedly induced logical states of the photon-based qubit include an artificially induced
4 coherent logical state, which states can be calculatedly expressed as man-made quantum
5 memory, register, bus, wire, logic gate, communications, error correction, i/o module, encoder,
6 decoder, and other information processing functions not found in nature.
1 48. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the calculated plurality of logical states includes an artificially induced

3 coherent state, which state can be calculatedly expressed as man-made quantum memory,
4 register, bus, wire, logic gate, communications, error correction, i/o module, encoder, decoder,
5 and other information processing functions not found in nature.

1 49. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the plurality of calculatedly induced logical states includes an artificially
3 induced coherent state at room temperature, which state can be calculatedly expressed as man-
4 made quantum memory, register, bus, wire, logic gate, communications, error correction, i/o
5 module, encoder, decoder, and other information processing functions not found in nature.

1 50. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the self-assembling protein molecule is a purified clathrin molecule.

1 51. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the artificially configured cage comprises artificially configured, self-
3 assembling synthetic protein molecules.

1 52. (Currently amended): A non-natural quantum information processing element according
2 to claim 4, wherein artificial and artificially configured receptors, adaptors, and vesicle comprise
3 natural and or synthetic protein molecules.

1 53. (Currently amended): A non-natural quantum information processing element according
2 to claim 1, calculatedly comprising an metallic artificially configured coating of one or more
3 materials on part or the entirety of the artificially configured cage that enhance functional
4 performance of the cage.

1 54. (Currently amended): A non-natural quantum information processing element according
2 to claim 4, calculatedly comprising an metallic artificially configured coating of one or more
3 materials on a portion or an entirety of the artificially configured receptors, adaptors, and vesicle
4 that enhance their functional performance.

1 55. (Currently Amended): A non-natural configured quantum information processing element
2 according to claim 1, wherein the man-made cage is artificially induced to be substantially
3 greater than one nanometer in diameter.

1 56. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the man-made cage is artificially induced to be at least about 50 nanometers
3 in diameter.

1 57. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the man-made cage is artificially induced to be at least about 100 nanometers
3 in diameter.

1 58. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the cage is artificially induced to be symmetric with respect to a plane in
3 order to facilitate a calculated result.

1 59. (Currently Amended): A artificial quantum information processing element according to
2 claim 1, wherein the artificially configured cage has been artificially ordered to have icosahedral
3 geometry in order to facilitate a calculated result.

1 60. (Currently Amended): A artificial quantum information processing element according to
2 claim 1, wherein artificially configured qubits are intentionally and linearly positioned by means
3 of artificial inducement at one or more desired vertices along a single plane using circulant
4 ordering in order to facilitate a calculated result.

1 61. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein by means of artificial inducement, multiple artificially configured quantum
3 information processing elements are physically linked together, which elements can be
4 calculatedly expressed as quantum memory, register, bus, wire, logic gate, communications,
5 error correction, i/o module, encoder, decoder, and other information processing functions not
6 found in nature.

1 62. (Currently amended): A non-natural quantum information processing element according
2 to claim 1, wherein by means of artificial inducement, multiple, artificially configured self-
3 assembling quantum information processing elements are functionally linked together, either
4 locally and or at an arbitrary distance, which quantum information processing elements can be
5 calculatedly expressed as man-made quantum memory, register, bus, wire, logic gate,
6 communications, error correction, i/o module, encoder, decoder, and other information
7 processing functions not found in nature.

1 63. (Currently amended): A non-natural quantum information processing element according
2 to claim 1, wherein the artificially configured quantum information processing element
3 calculatedly forms an artificial hybrid system upon its being artificially induced to perform

4 physical and or functional integration with one or more non-invention elements in vitro and or in
5 vivo.

1 64. (Currently Amended): A method for forming a non-naturally occurring quantum
2 information processing element offering precise control over its fabrication and operation
3 comprising

4 a man-made cage, up to 100 nanometers in diameter, defining a calculated, artificial,
5 environment-isolating cavity that is bioengineered and formed from a plurality of self-
6 assembling purified Clathrin protein molecules,
7 and

8 one or more man-made cargo elements calculatedly located within the man-made cavity,
9 wherein at least one of the cargo elements comprises a man-made, artificially configured qubit
10 element that is by design programmable into a plurality of one or more logical states, which
11 states can deliberately entail, promote, enhance, and exploit the properties of quantum coherence,
12 superposition, entanglement, communications, and other quantum phenomena,
13 and

14 one or more of these man-made elements can be calculatedly expressed as non-naturally
15 occurring quantum memory, register, bus, wire, logic gate, communications, error correction, i/o
16 module, encoder, decoder, and other information processing functions not found in nature,
17 enabling the functional basis of a man-made quantum computer.

1 65. (Currently Amended): A non-natural quantum information processing element according
2 to claim 1, wherein the non-natural quantum information processing element comprises,
3 a functionalized, artificially configured cage for calculatedly attaching one or more
4 artificial elements external to the artificially configured cage.

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